Attorney's Docket No. 7-4220

HEATING ELEMENT

The invention concerns a heating body in accord with the principal concept of Claim 1.

Heating bodies are generally constructed of a base body of unalloyed steel with a surface coating, in order to attain certain desirable coloration appearances. In this practice, depending upon the location of the said heating body, different coating procedures are used. Thus it is possible, for example, that heating bodies in residential areas are provided with a powdery coating or they may be lacquered. Most likely a heating body in a bathroom can be electrically chromed.

The above described procedures and materials have the disadvantage, that the surface coating negatively affects the heating capacity of a steel heating body. Thus, for example, an electrically chromed, steel heating body, as compared to a lacquered or powder covered steel body, will yield only 20 to 30% as much heat. This poor rendition of heat from chrome covered steel heating bodies results in the construction of very large heating bodies, which in turn, each disadvantageously require a large space allotment.

The purpose of the present invention is to create a heating body with a similar, highly reflective surface, which resembles a chromed heating body, which sets aside the above named disadvantages and is further, simple and economical to produce.

This purpose is achieved by a heating body with the features of claim 1.

The heating body in accord with the invention has a base body of metal, especially aluminum. The surface of the said invented base body is worked in such a manner, that a conventional electrically applied chrome coating or gilding, for the purpose of and bringing about a highly reflective surface, can be eliminated. Instead of aluminum, it is also possible to make use of any other metal, such as, for instance, a highly refined steel.

In accord with the invention, the surface is then of high polish and possesses a degree of reflectivity of 80 % to 100 %.

Because of the aluminum, that is to say a metallic, base body and the elimination of the electrical chrome application, the invented heating body has a substantially greater thermal efficiency than does the conventional chromed, steel heating body. Thus, a conventional heating body, which possesses a chromed coating, when compared to an invented, highly polished heating body constructed of aluminum, exhibits a thermal efficiency which is about 30 % to 40 % less. In other words, the invented heating body, when operating at the same heating load, can clearly be made smaller and less expensively. This is a considerable advantage in bathrooms with predominately less available space.

For the achievement of the desired degree of burnish, the metal construction of the invented heating base body is mechanically ground, mechanically polished and chemically and electrochemically polished.

One embodiment of the invented heating body advantageously possesses, for the purpose of increasing the resistance to corrosion and for the retention of the high degree of burnish, an Eloxal coating.

Another embodiment provides, for the increase of resistance to corrosion, and for the retention of the high degree of burnish, a clear lacquer coating.

Intrinsically, known heating bodies with an aluminum base body are often chromed for the purpose of creating a highly reflective surface, which requires not only a complicated procedure and is expensive, but further, notably reduces the emission of heat.

Other advantageous designs are the subject of further subordinate claims.

In the following, the invention is more closely described with the aid of an illustrated presentation of a preferred embodiment. Fig. 1 shows a perspective view of an invented heating body.

The invented heating body 2 has a base body 4 and two connection fittings 6, 8 connecting respectively to an inlet line for water supply and to an outlet line for the removal of the used water. The external inlet and outlet lines are not shown. The base body 4 has two parallel running tubes 12, 14, which are distanced from one another by the crossover tubes 16. With this arrangement, the water can flow between the two tubes 12, 14, so that, for example, hand towels (not shown) can be hung on the crossover tubes 16 to be dried.

In accord with the invention, the base body requires no surface coating for the attainment of the desired degree of reflectivity, but rather the surface is worked in such a manner, that both the aesthetic total impression of the heating body 2 is increased and the base body is also protected against corrosion and damage.

In a preferred embodiment, the surface possesses a degree of reflectivity of 80 % to 100 %.

As an aid for the judgment of the luster of the finish, a reflectometer is applicable, which is in accord with DIN 67 530.

An essential advantage of the invented heating body 2 is, that in comparison to conventional chromed steel heating bodies, it possesses an improved degree of heat transfer. For example, of a chromed heating body, the statement is made, that a heat load of some 750 W is developed. Contrary to this, an equally sized aluminum heating body 2 develops a heating load of about 1100 W. That is to say, the invented heating body 2 possesses, size for size, about a 50 % greater heat production, whereby its high heat transfer capability permits a quicker reaction for the input and output control, such as, for example, might be called for by thermostatic regulation. Such an advantage can markedly reduce the heating costs.

The metal base body 4 of the heating body 2, in keeping with the invention, is mechanically ground for the achievement of the desired degree of reflectivity, then mechanically polished and chemically (electro-chemically) brought to a high reflectivity.

The mechanical abrasive treatment is mostly done by rough grinding for the removal of gross protrusions and depressions of the surface 10. This is generally carried out by a grinding disk. In general dry grinding is employed, whereby the circumferential speed is held to within a range of 420 to 1200 RPM.

After the rough grinding, then a secondary grinding takes place. For this operation, advantageously, a grinding disk arrangement is again used wherein the laminated disks are impregnated with special clay. The 60 to 120 mesh clay is impregnated into a fabric which can be of cloth, sheepskin, or muslin. The disks may turn within a range of 1500 to 1800 RPM. However, even a rotation speed up to 3000 RPM may be used.

Subsequent to the secondary grinding, fine abrasive treatment takes place. This can also be known as pre-polishing. Normally, the disks for this purpose, as described above, can be of felt, sheepskin or bias cut muslin fabric with impregnated 100 to 200 mesh clay. The operation is cooled by air flow. The circumferential speed lies somewhere in the ranges as given above, although it may be slightly increased.

After the mechanical grinding, the surface 10, for the removal of abrasion traces, and for the acquiring of a luster, is similarly mechanically treated, this time with a polishing disk. The polishing disk possesses more laminations, preferably of loose or battened cotton material and turns at some 2000 to 2600 RPM. This polishing is optionally carried out dry or wet. In order that the hardness of the polishing disk may be changed, it

is possible, that among other changes of a fiber count of the cotton material, also cloth, wood or paper insertions may be interposed between the individual disks.

Care must be taken, in regard to the mechanical polishing of the invented heating body, that, in particular, no metal particulate are to be allowed to adhere to the polishing disks, since such inserts, without fail, lead to a lessening of the surface quality.

Fundamentally, attention must be given during the mechanical grinding and polishing, that no excessive temperatures are generated and no gouging of the surface takes place. A protection of such temperature can be brought about, for the safety of the surface, by an appropriate choice of the speed of rotation, pressure of the abrasive means, as well as by means of proper design of the said disks or by the use of abrasive or polishing means such as greases, oil or pastes.

By the employment of abrasive and/or polishing means, the impingement of these materials in the surface 10 is to be avoided, since such embedded materials can be released during the next process step and thus impair the quality of the surface 10.

Further, in a case of large heating bodies 2 with greater surfaces 10, it can be of advantage, to replace the grinding disks with abrasive belts.

For the achievement of a final luster, the surface 10 is treated, after the mechanical phase, chemically or electrochemically. Preference is given to the chemical treatment, since such a procedure, counter to the electrochemical

method, such as, for instance, the Erft-works process has the advantage, that no electrical energy is required. In this way, instead of electrical current, oxidizing agents are used.

Advantageously, the surface 10 is finally electrochemically anodized, or treated with Eloxal, so that the resistance to corrosion of the said surface is increased by an Eloxal-coating. This is especially valuable, if the heating body 2 is to be used in rooms subject to high humidity, such as, for example, bathrooms or, as mentioned above, the heating body is to be used for the drying of towels.

By the above, the surface 10 is chemically changed, so that a porous aluminum oxide layer is formed, which is still to be sealed in a final step of the process.

It is also possible, that the surface 10, instead of being coated with the Eloxal layer, receives a finish of a clear lacquer for the increase of the resistance to corrosion. In this case, the lacquer coating can be applied by spraying, or in the form of a powder, or by means of a fine brush, or the lacquer can be applied by dipping into a immersion bath.

Disclosed is a heating body with a base body of metal, preferably aluminum or high quality steel, the surface of which, is caused to be of high reflectivity and resistant to corrosion.

Reference Numbers and Corresponding Components

2	Heating body
4	Base body
6	Connection fitting
8	Connection fitting
10	Surface
12	Parallel tube
14	Parallel tube
16	Crossover tube(s)